In addition to relief by 1,000-foot contours, which will be printed in brown, and drainage, which will be printed in blue, there will be printed in black such cultural features as State and county boundaries, names of county seats and important cities, the lines and names of all railways, and the outlines of Indian, forest, and other public reservations. H. M. W.

MR. E. A. REEVES'S NOTES AND SUGGESTIONS ON GEOGRAPHICAL SURVEYING AND PRACTICAL ASTRONOMY SUITED TO PRESENT REQUIREMENTS.

BY

G. W. LITTLEHALES.

In the exordium of his address, in September, 1903, before the Southport Meeting of the British Association for the Advance of Science, Mr. Reeves has pointed out that the era of general geographical exploration has practically closed, and that the era of mensurational geography has set in throughout nearly the whole world. Except in the polar regions there are no longer any vast areas of the earth into which an explorer may penetrate and emerge with the glory of a Livingstone or a Stanley. Men capable of giving a good account of what they observe have visited nearly every part of the earth's surface and brought back enough to provide for the first rude approximation to the mapping of the world. The needs of the present time require that travellers who aim to contribute toward an advancement of geographical knowledge should be equipped to record their observations upon a scientific basis. In order that conjecture may give place to measurement, Mr. Reeves rightfully advocates that the explorer should expand over the region to be traversed a system of rapid triangulation, starting from a measured base-line connected with some point where latitude and longitude have been fixed by previous operations or by his own determination, and should delineate the surface forms and other characteristics, in relation to the stations of the triangulations, by the use of one of the more simple forms of plane-table.

For the construction of the plane-table sheets Mr. Reeves

recommends the "Survey of India" projection, which is based upon the principle of treating a certain limited portion of the surface of the globe, such as a degree-quadrangle, as if the globular contour had been planed off flat within the chosen limits. Tables for facilitating the construction of this projection are to be found in the Auxiliary Tables of the Survey of India, but perhaps the American explorer might prefer the polyconic projection, which is in use by all the geographical surveys of the United States, and with reference to which ready means of construction may be found in the Projection Tables of the United States Hydrographic Office and in many other equally well-known American works.

Great as is the importance that the modern geographical explorer should be a draftsman capable of generalizing the physical features of a country, so as to represent the leading characteristics with their proper prominence and the details with appropriate subordination, and that he should have a practical knowledge of surveying and astronomy, of even greater importance is it that his instrumental equipment should be reliable within the limits imposed by portability and ease of manipulation. As a result of the author's own experience and investigations, while recognizing that there are occasions when the sextant is the only instrument that can be taken for the measurement of angles, he assigns to the first place among the explorer's mensurational instruments the 6-inch transit theodolite reading with micrometers on both vertical and horizontal circles to $5''$, and by interpolation to $2''$, or failing this, by verniers to $10''$. With such an instrument a close approximation to the latitude of a station may be obtained from circum-meridian altitudes of stars, and triangulation may be carried on throughout a large extent of country with such a degree of precision that no appreciable error will result when the work is projected on a scale of $\frac{1}{250000}$, or nearly one-fourth of an inch to the mile. Mr. Reeves has instructively described how, with such a triangulation executed, a small plane-table, measuring $1\frac{1}{2} \times 2$ feet and perhaps smaller, fitted with a telescopic-alidade by which vertical angles as well as horizontal directions are taken, may be employed for the rapid and reliable delineation of large extents of territory, in which the surface characteristics will appear in their proper relative locations and with their forms described in roughly controlled contour lines. The assignment of such a piece of work to its exact place on the face of the earth must, of course, depend upon the determination of the latitude and longitude of some point within its limits, but it is not essential to the usefulness of the survey that this be done at the time

the survey is made, for if it be neglected then, obviously the work will remain as a unit to be assigned to its proper geographical place at whatever time in the future a final determination of the geographical position may be made.

The paper under review sets forth the best ordinary methods that would be available to the explorer for finding latitude and longitude, and does not fail to point out that under the vicissitudes of travel all watches and chronometers that may be transported for time are liable to such uncertainties of rate that all but relative determinations of longitude are extremely unreliable. Among the so-called absolute methods that are mentioned as available for determining longitude, or Greenwich Mean Time, the photographic method devised by Captain E. H. Hills, R.E. (see "Determination of Terrestrial Longitudes by Photography" in the Monthly Notices, Royal Astronomical Society, London, January, 1893), might have been included, because superior results may be attained by its employment in localities isolated from all agencies usually employed in the determination of time.

NEW MAPS.

AMERICA.

NORTH AMERICA.—Karte von Nord-Amerika. Scale, 1:10,000,000, or 157.8 statute miles to an inch. 33 x 27 in. From the Sohr-Berghaus Handatlas. By Dr. A. Bludau and Otto Herkt. Carl Flemming, Glogau. Presented by Lemcke & Buechner, New York City. (Price, 4 marks.)

This may be the first detailed map of North America showing the Republic of Panama. In spite of its small scale the map presents effectively an enormous amount of information. All that is known of the distribution of gold in Alaska and the Yukon Province of Canada is shown on this map. Similar information cannot be found on comparatively large-scale maps of Alaska published in the United States within the past few months; nor do we often see, as in this work, the lighthouse system of our Great Lakes depicted on a map embracing the continent. We know of no other map of North America which presents so much geographical, ethnological, and economic information. The names of the Indian tribes and other aborigines are printed in red, making it easy to find their habitats. The oceanographic information, as relates to the conformation of the sea floor and to cable lines and ship routes, is particularly full. The Arctic islands discovered by Sverdrup are shown, but Peary's latest work is north of the map's limit. There are 11 inset maps.

MINNESOTA.—Atlas of the Vermilion Iron-bearing District. By J. Morgan Clements. United States Geological Survey. Washington, D. C., 1903.

This Atlas accompanies monograph XLV on the Vermilion iron ore district in northeastern Minnesota. It contains 23 map sheets, of which 7 are topographic,